THE RIDDLE OF THE FOURTH DIMENSION

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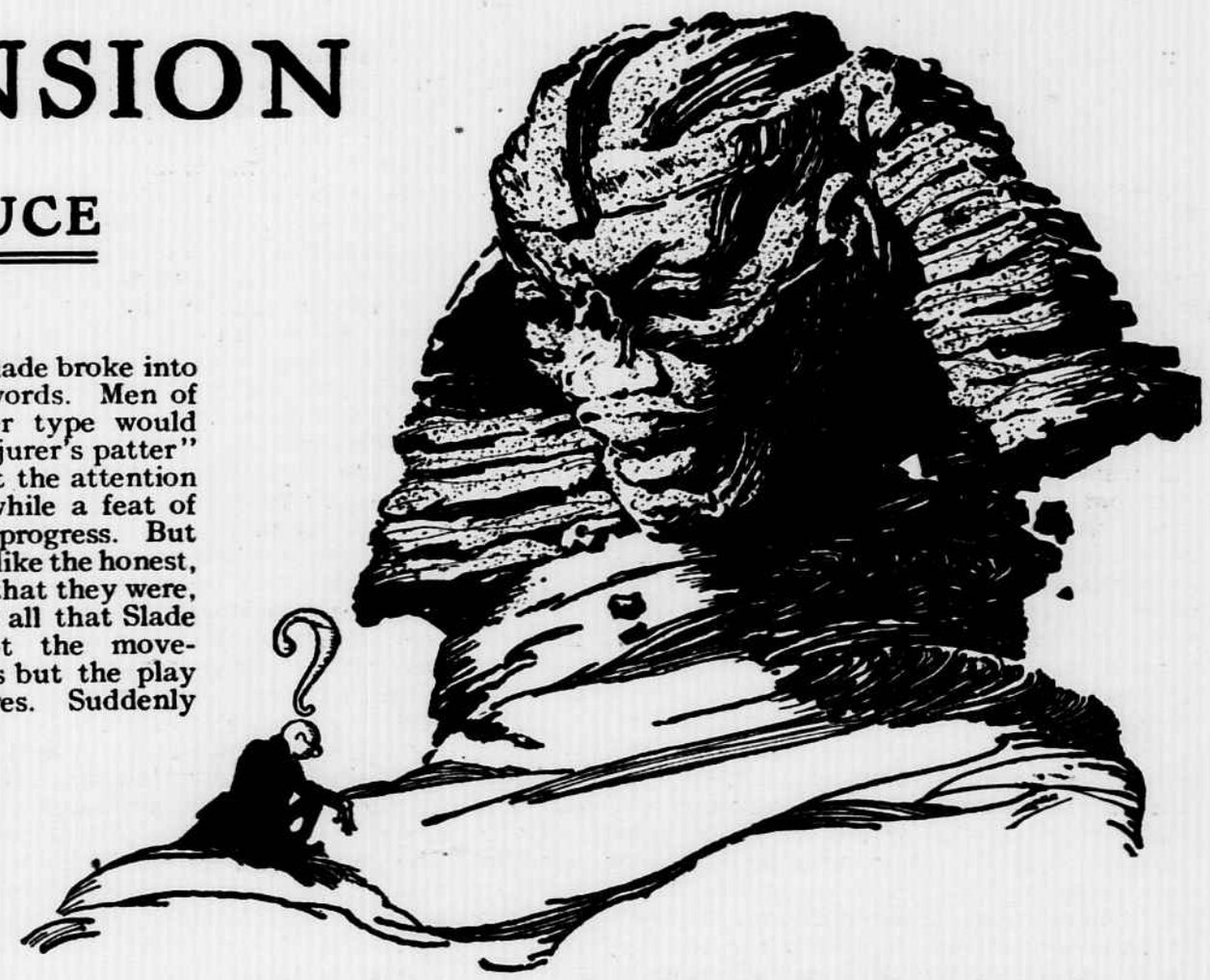
Drawings by Joseph Clement Coll



ON a May morning of 1878, three men sat together in a sun bathed room in Leipsic. Two of the three were old men, and unmistakably of the Teutonic race. Their features also indicated great intellectual development, as became savants whose names were household words in the world of science. One, Johann Karl Friedrich Zöllner, had long been famed as an astronomer and physicist, and at that very time was occupying the chair of astronomy at Leipsic University. The other, Wilhelm E. Weber, was no less representative of the best scientific endeavor of that most scientific of countries, Germany.

Altogether different stood the case with the third member of the little group. His nationality would be hard to place, but was in fact American. A dreamy, mystical face, eyes that had a far away look, long, artistic fingers, and a body that seemed made of springs, proclaimed him a man of singularly nervous temperament. His name was Henry Slade, and in his own way he was fully as celebrated as his scientific companions. He had, indeed, only recently been a storm center of controversy, some asserting, but more denying, that he possessed the rare gift of acting as an intermediary between the living and the dead, Fame, or notoriety, first came to him with his seemingly miraculous production of messages written on locked and sealed slates; and as his repertoire broadened to include other remarkable manifestations of occult power, he soon threatened to surpass in popularity even that prince of wonder workers, Daniel Dunglas Home.

Then, however, Slade experienced a sore rebuff. Visiting skeptical England in the summer of 1876, he was unwise enough to give a séance to Professor Ray Lankester, an ultrascientific scientist. As was his custom, Slade showed Lankester a hinged slate, apparently clean as the day it was bought, closed and locked it, and announced that presently ghostly fingers would write a message on its virgin surface. But Lankester, incredulous, did not wait until the scratching of a slate pencil should indicate that the "spirit" writing had begun. Instead, rudely tearing the slate from Slade's hand, he burst it open, and discovered that the message had already been written. After which, with unscientific vindictiveness, he brought action against Slade as a common swindler, who used sleight of hand to separate superstitious persons from their money. With a term in jail staring him in the face, the medium naturally decided to seek pastures new. And thus it came about that he found himself in Germany, exhibiting his powers to men who, as he learned after one or two séances, were distinctly more sympathetic and open minded than the unfeeling Ray Lankester.

Slade's Great Test

THAT pleasant May morning in 1878, therefore, he waited with supreme confidence, while Professor Zöllner slowly drew from a capacious coat pocket two or three small cardboard boxes which gave out a jingling sound.

"Your earlier tests," said Zöllner, in the trembling accents of old age, "have entirely satisfied me, Dr. Slade, that our ideas of the properties of space must undergo a radical revision, and that besides length, breadth, and height, space has a fourth dimension in which we live but of which we commonly are unaware. The knot test—when you tied four knots in an endless cord—was exceptionally good; but since it is as well to obtain cumulative evidence, I wish you would endeavor to execute the coin test that we unsuccessfully attempted six months ago.

"I have here, as you know," and he shook the cardboard boxes, "three coins, which, under the accepted conditions of space, it would be quite impossible to remove without breaking the boxes. If my hypothesis of the fourth dimension is correct, however, it should be as simple a matter to extract them as would be the case did the boxes have an opening. I put the boxes on the table between us,—so,—and ask you to exert your strange power to empty them of the coins."

Drawing his chair up to the table, and extending his hands with quick, nervous gestures, Slade broke into a voluble flow of words. Men of the Ray Lankester type would have called it "conjurer's patter" intended to distract the attention of the spectators while a feat of legerdemain was in progress. But Zöllner and Weber, like the honest, unsuspicious souls that they were, listened eagerly to all that Slade said, watching not the movements of his hands but the play of his mobile features. Suddenly he grasped a slate and held it out under the table. The sound of writing was heard, then a ringing noise, and at that instant, out of empty space as it seemed, a five-mark piece fell on the slate, to be followed almost immediately by two smaller pieces of money.

"The coins! The coins!" cried Zöllner in ecstasy. With fingers that shook so they were almost powerless, he tore open the cardboard boxes, to find them empty save for a couple of pieces of slate pencil, which, Slade hastened to explain, had evidently been placed there by the "spirits" after they had written on the outstretched slate. Overcome with joy, Zöllner turned to his colleague.

"You saw it, Weber! There was no fraud, no cheating! Ah, at last incontrovertible proof of the verity of the fourth dimension has been obtained! The world must know of this!"

The Wonderful New Thought

IN this manner, with the aid of a man that had been hounded out of England for swindling, whose methods were afterward to be mercilessly exposed in his native land, was there born one of the most bizarre and at the same time most fascinating conceptions that have ever entered into the mind of man.

To be sure, the notion of four-dimensional space was not original with Johann Zöllner, professor of astronomy at the University of Leipsic; it had long been used by mathematicians as a convenient aid to the discovery and expression of truths applicable to geometry and to algebra operating with more than three unknown quantities. In fact, mathematicians found the assumption of a fourth dimension necessary as well as serviceable for the solution of certain problems. But they did not ask people to believe that space actually possessed one or more dimensions other than length, breadth, and height.

This, however, was precisely the position taken by Zöllner, and held by him to afford the only satisfactory explanation of many of the feats of spiritualistic mediumship. Nor did Zöllner long stand alone. Appealing as it did to the imagination of speculative scientists, and finding more persuasive grounds for belief than the debatable facts of the Slade séances, the idea of four-dimensional space spread so rapidly that to-day it boasts advocates, and really learned and able advocates, in every quarter of the civilized globe.

Its nature and meaning may best be made clear by the argument from analogy employed by the most recent exponents of the fourth dimension. Suppose a world in which space was not of three but merely of two dimensions,—length and breadth. Such a world would be absolutely flat, as would its inhabitants. It might well be compared to a vast sheet of paper covered—to borrow the description given in his "Flatland" by Edwin Abbott, one of the most ingenious explorers of the fourth dimension—with a quantity of straight lines, triangles, squares, and other figures, which, instead of remaining fixed, move freely about, though without the power of rising above or sinking below the surface. The people of Flatland, to put the matter otherwise, would know absolutely nothing of upward or downward motion, would be compelled to move always on a dead level, would see each other only as lines; and, finally, would possess nothing of the quality known in our three-dimensional space as "solid"—although, to themselves, they would seem solid enough.

Similarly, if the Flatlanders dwelt in houses, their homes would be nothing more than open surfaces inclosed by lines, with swinging lines to take the place of doors. In order to imprison a Flatlander, it would thus be quite sufficient to draw an unbroken line around him. Not having the power of upward or downward motion, he could neither step over it nor burrow beneath it, and to him it would be fully as impassable as a stone or iron wall.

Now, even if this two-dimensional world was situated in the very midst of the three-dimensional space familiar to us, its people would ordinarily have no conception whatever of the larger space surrounding them. The latter would be, for all practical purposes, completely outside their universe and entirely invisible to them. Indeed, "upward" and "downward" and "height" and "depth" being terms that conveyed no meaning to their minds, they would be strongly inclined to deny the mere possibility of three-dimensional space, and would probably unite to suppress any rash individual that might assert its existence on the strength of some otherwise inexplicable experience. The only knowledge they could have of it would come from the intrusion of some inhabitant of the three-dimensional world into the plane on which they lived. And even then he would seem to them to be a supernatural being; or, if they disbelieved in the supernatural, would sorely perplex them as suggesting the need of sweeping changes in their long established notions of the universe.

Visiting the Flatlanders

IMAGINE for example, the sensations of a Flatlander at the unexpected appearance of a three-dimensional man in his bed room. He had securely bolted the door before retiring; had made sure that no midnight marauder could gain entrance. Yet there, before his startled eyes, stood an uncouth and monstrous shape, different from any he ever had beheld before. The three-dimensional man would not, it is true, be seen by the astounded Flatlander in the form familiar to other three-dimensional men. And, at the slightest upward or downward motion, he would instantly vanish from sight. But so long as he remained on the same plane as the Flatlander, he would be visible, and would be recognized as other than a native of Flatland.

Most perplexing of all would be the question of how he gained admittance to the house. The Flatlander, having no idea that everything about him was open overhead, could not possibly appreciate the fact that the three-dimensional man had entered by the simple process of stepping across the lines that formed the walls of the house and of the bed room. And matters would not be much clearer to his limited understanding, if his visitor undertook to give him a concrete demonstration of the properties of the third dimension.

"You see," we may fancy the three-dimensional man explaining, "I am not obliged, like you, to move always on a level. I can go up or I can go down; and being able to go up and down I can easily step over the lines that seem to you to be solid walls, and also can look directly into this room, which you imagine is all inclosed but which is really open to the gaze and entrance of every three-dimensional being. The same is true of your cupboards, and bureaus, and everything else in which you store your